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# Management of the Internet and Complex Services

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## ***Deliverable D4.1***

### **EMANICS Specification of the Static & Dynamic Content for Dissemination Environment + Approved and Operational Web site**

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# 1 Executive Summary

The most directly related initiatives to the EMANICS dissemination goals, owned or maintained by EMANICS partners, are the SimpleWeb site hosted by the University of Twente, the TMN Web site hosted in the INRIA domain and the Policy Resources Web site maintained by the Policy Research Group at the Imperial College of London. Pros and cons of these pages are summarised in terms of strong points and weak points, and their relationship with the EMANICS Web site is highlighted.

The EMANICS Web site is specified in terms of publicly available content and consortium restricted content. Belonging to the first category, we have the description of the EMANICS project, the newsletter issues, the other consortium documents that are tagged as public, the calendar of events and events descriptions, news and links to other related places. Belonging to the second category, we encounter the document and file sharing facilities, the collaboration environment for each of work package, meeting schedules, minutes and other related documents, mail archives and the contact information database. The specific organization adopted for all this information constitutes the architecture of the EMANICS Web site.

The current Web environment is based on the LibreSource collaboration system. Nevertheless, to provide infrastructure for dynamic content management especially for the public site, the introduction of a Content Management System (CMS) has been proposed. A CMS allows participants to easily update content with a user-friendly interface and defined user access based on hierarchical permissions. Among the many existing CMSs available today, Joomla has been chosen. Joomla is written in the language PHP and it uses a MySQL database. It includes features such as page caching to improve performance, Web indexing, RSS feeds, printable versions of pages, news flashes, blogs, forums, polls, calendars, Web site searching, and language internationalization. Migration of the EMANICS Web site to Joomla is done following well determined steps. Most of the steps have been already accomplished on a test version server. Moving to an operational server is in progress.

Content integration is based on a set of dictated functional and non-functional requirements. One of the aspects considered in the functional requirements is the proper identification and formulation of the scope of the content. For simplifying purposes at the start and focusing the problem, the views are restricted to a Quality of Service (QoS) Management information portal. In this portal, three categories of content have been identified, namely IP Networking information, Fixed Networks QoS Management and Wireless Networks and MANET Management.

Taking into account the needs of the different stakeholders, the content and layout to be presented to the users of the QoS Management portal is identified. In order to ensure extensibility and manageability of the information portal, the technical aspects of the design require equally cautious consideration and planning. The technologies that will be used should allow the generic implementation and allow for ease of deployment and effortless introduction of new content or update of existing one. In this sense, we propose exploiting XML technologies for storing the content information and XSLT for the presentation of the content through the information portal.

## 2 Introduction

Dissemination of information is a crucial activity in the scope the EMANICS Network of Excellence. This is, first of all, because it will facilitate the collaboration of the Consortium members through the Network. But, in addition, this activity will serve to convert EMANICS in a beacon of the network and service management domain at European level and even worldwide that will in turn facilitate the recognition and growth of our community.

Dissemination entails two parallel objectives. The first one consists of identifying the information and the flows of information that is useful for cooperation and/or to be disseminated at the network of excellence level and outside of it. The second consist of designing and implementing the procedures and the overall infrastructure for electronic cooperation and knowledge dissemination of the identified information within as well as outside the NoE.

At the kick off of this NoE we didn't start from scratch. The "WEB site" is well established in nowadays culture of people. Almost any organization or even individuals are making use of this concept and tools to arrive to the others. Moreover, there were some EMANICS partners who had implemented or contributed in Web sites in the area of dissemination of network and service management technology [1-3]. This can be advantageous but in some sense a disadvantage because of the biasing that it may constitute.

Anyhow, even before the official Project kick off date, the EMANICS Web site was already made available. The idea was to offer partners the possibility to exchange documents thanks to the **wiki**<sup>1</sup> and establish the artwork that would give us the differentiation signs through out the project lifecycle. Most of this original structure has been kept as can be seen at [4]. In addition, efforts were oriented to the investigation of new dissemination tools like audio and video **podcasts**<sup>2</sup> and to understand how to integrate the valuable information repositories owned by all the participants in a common framework. Currently we already have the initial results on both initiatives. Also worthy to mention the decision adopted concerning the migration of the operational environment of the Web site from the initially adopted one, namely LibreSource [5], to Joomla [6] because it may offer more flexibility in terms of the integration of dynamic contents. Our approach is to build the dissemination environment upon the results and the experimentation based on previous experiences. The bases are already established and the work is in progress.

The purpose of this document is to describe the achievements reached in the initial six months of the project in the scope of the definition and implementation of the electronic dissemination environment. Hence we have structured it in nine sections as follows.

Sections 1 and 2 contain an Executive Summary and this Introduction, respectively.

Section 3 is devoted to present what can be considered as the most related references that constituted the starting point of our dissemination environment design [1-3]. For each of these three Web sites we highlight their respective content architectures and

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<sup>1</sup> A **wiki** (from the Hawaian *wiki wiki*, «fast») is a type of Web site where it is accepted that users can create, edit, delete or modify the content of a Web page interactively, quick and easy.

<sup>2</sup> **podcast** is the method of distributing multimedia files over the Internet for playback on mobile devices and personal computers

then we summarise their main strong and weak points to, finally, present the expected relationship with the EMANICS site.

Section 4 is devoted to describe the EMANICS site properly said. It starts presenting the requirements in terms of which content must be exposed and which must be made publicly available or restricted to the Consortium members. In the following sub-section, the site architecture is presented making use of snapshots of the most important screens, so that the reading is self-contained and well adhered to the latest version of the site. This sub-section ends with details of both the software and the supporting hardware. The next sub-section presents the new operational framework that is based in CMS-Joomla [6] and that is intended to allow for a more flexible content management. Section 4 ends with the immediate steps to be pursued.

Section 5 is devoted to describe the achievements in the activities developed in parallel to the one mentioned above. In the first subsection, we report the initial steps followed in the area of using podcasting as a dissemination tool and the following is centred in the specifications to allow for content integration. A set of non-functional and functional requirements that should be fulfilled by any dissemination portal are first presented. A second step is covered focusing in a concrete QoS portal that will be launched soon and that will serve as the testbed for future specialised portals. The content of such portal is specified taking into consideration the needs of the main stakeholders.

Sections 6 to 9 are devoted to present the conclusions of this work, the references, the abbreviations and the acknowledgments, respectively.

## 3 Reference Network Management Dissemination Initiatives

The development of the Electronic Dissemination Environment in EMANICS is built upon related initiatives, started years ago by some of the consortium members. These are the SimpleWeb, the TMN page at INRIA and the Policy Resources at the IC.

### 3.1 *The SimpleWeb*

The "SimpleWeb" [1] is hosted at the University of Twente, and sponsored by EMANICS. The site became operational in 1992 and is one of the most popular Web sites in the area of Internet management. It provides links and information on network management, including software, RFCs and tutorials. The focus is on SNMP and Internet management, but people interested in other management technologies will also find interesting information on Internet Technologies and Complex Services.

Information is currently categorized as follows:

- Specific Internet management information

The most interesting pages are probably the MIB pages, which include examples from many different devices. Our online MIB module validator, which is also unique, may be useful for many people. Other information one can find are links to relevant IETF pages, all RFCs and Internet-drafts (updated nightly), IETF management RFCs sorted in various ways, vendor specific MIB modules, a MIB search engine, links to IETF/IRTF project pages and FAQs

- Information on standardizing organizations

Links to organizations that standardize network management such as IETF, DMTF, ISO, ITU, TMF and OMG.

- Software

Links to commercial and freely available SNMP (and other) software packages. An online form allows new packages to be registered.

- Events and Contact Information

Conference announcements, call for papers, pointers to research organizations, newsgroups, mailing lists and other WWW servers.

- Bibliography

Information that is particularly useful for the research community. It includes links to Ph.D. theses, books, etc.

- Tutorials

Tutorials on SNMP and TMN. Tutorials are presented as REAL media videos, PDF and PowerPoint slides and HTML documents. There are also many interactive exercises.

#### Strong points

- Completeness as far as the SNMP management world is concerned
- Richness in tutorials that even contain exercises on the main covered topic



- The categorization of a lot of software management tools, both free and commercial

#### Weak points

- No other standards or techniques different than SNMP and limited view of TMN are considered

#### Relationships to the EMANICS Web site

The SimpleWeb is seen as very valuable in the EMANICS consortium from three points of view. First, because the EMANICS Web site can benefit from taking it as a reference of what a dissemination portal must be, at least up to the static content is concerned. Second, because EMANICS can benefit from the experience gained in maintaining the page through a long period of time. Third, because EMANICS is planning to use the SimpleWeb as a mechanism to reach its dissemination goals; In other words, the SimpleWeb is considered as part of the electronic dissemination means that EMANICS will use and therefore it has been planned to enhance that portal especially in the area of dynamic content support.

### **3.2 The INRIA TMN Web Page**

The TMN page maintained by Olivier Festor [2] is constituted by the set of the following sub-pages whose intended content is easily deduced from their respective titles.

- TMN related Books and Tutorials
- TMN vendors
- Free OSI Tools
- TMN relevant consortiums
- TMN Standardization bodies
- TMN related conferences and journals
- TMN sites and Research groups
- TMN miscellanea (not yet classified)
- Formal Methods

#### Strong points

- Subject coverage
- The scope of this page, as far as TMN is concerned, is fairly acceptable. In fact, it offers content that is useful to understand the technology and solutions to use it.

#### Weak points

- Maintenance

A quick navigation path through the pages shows a lack of maintenance because many links are outdated or simply inexistent. This raises one of the problems of any dissemination policy through an organization that will disappear after a given period of time. Information could be classified as short/medium term validity and long term validity

- Design

The design if this page is very simple. In fact, it consists of just a set of links. A bit of artwork would be advisable

- Content

TMN has produced a lot of solutions during the years it was a hot point for the industry and the academia. These solutions should be covered as well. In addition, although TMN is not a management technology of current days, the latest recommendations adopted by the TMF should also be covered

#### Relationships to the EMANICS Web site

This page is a characteristic example of static content dissemination that could be adopted in the EMANICS Web site. The idea would be to consider a set of management technologies and for each of them to create a page like this one; this is, a page spanning from the research to the industry passing through the standardization, etc. This type of page is essentially static, namely its content is decided beforehand and practically not modified unless for very specific updates.

### **3.3 The IC Policy-based Management Web Page**

Under the title “Policy Resources”, the Policy Research Group of the Imperial College London (IC) includes in its own Web page a portal to different policy-based related content [3]. The structure is as follows:

- Conferences listing
- Journal publications
- Links - Standards efforts
- Links - Policy research in academia
- Links - Vendor specific policy information
- Links - Other policy information on the web
- Links - Trust and security
- Links - Network management

#### Strong points

- Addresses are a hot topic nowadays
- Due to its structure, the page can be easily upgraded; that is new links can be added or removed. Therefore this makes it candidate for future reuse in the context of EMANICS

#### Weak points

- Excluding the “Policy Workshop”, the other conference and journal references are not policy-based management specific. Therefore these lists are too short and it would be advisable to include more titles susceptible to publish work related to policy based management and not only the few that are given.
- The fact that it is essentially based on links has been mentioned as a strong point. Nevertheless, this is not exempt of risk. In fact, when some of these links are moved or contents are substantially modified and the owner of the referencing portal does not quickly detect this, this may create doubt about the usefulness of the

portal to any potential user and therefore discourage her/him to continue making use of it. This problem can be mitigated by periodically looking for the availability of all the referenced links.

- Lack of white papers, software or tutorial content that would be attractive to industry and readers outside the policy community”
- Some links are too generic to appear in a portal essentially intended to disseminate policy-based management information.

#### Relationships to the EMANICS Web site

Policy-based management is undoubtedly one of the candidate technologies to be disseminated in the context of EMANICS. Properly upgraded, most pages of this portal could be adopted as static content of the EMANICS dissemination information on that area.

## 4 The EMANICS Web Site

### 4.1 Overview

A project web site is a common and effective method of dissemination of information. The public part of the Web site is accessible for everyone in the Internet; therefore the structure of the site has to be user friendly. Also content of the site has to present main goals of the project and reflect current progress of work as well as include other content, which is rarely changed. For this reason, the EMANICS Web site must meet certain criteria such as that of high availability, to implement stable solutions and to be easy to extend to reflect future requirements. The following chapters describe the initial requirements and architecture of the EMANICS Web site.

### 4.2 Requirements

The requirement analysis based on project partners needs resulted in dividing the EMANICS Web site into two areas: public and private. The first one dedicated for general project audience will be publicly available. The second restricted part of the Web site will contain all project internal documents as well as serve as a platform of cooperation between EMANICS partners. Both parts have to meet different sets of requirements.

The lists below present the most important requirements for the EMANICS project Web site.

Requirements for the public Web site area include the following:

- Main description of EMANICS project including: overview, goals, partners, contacts, etc.
- Newsletter
- Deliverables and other documents for public downloading
- Calendar of events and events descriptions
- News and shorts highlighted on front pages
- Links to other related places

Requirements for the private Web site area:

- Document and file sharing facilities including deliverable repository, contract documents, etc.
- Collaboration environment for each of the work packages
- Visibility of documents for project reviewers
- Meeting schedules, minutes and other related documents
- Mail archives
- Contact information database

It was considered important to define the basic features and deploy the web site from the beginning of the project. Moreover, as high availability of the site is a necessity, it was decided to put it on a production quality server.

### 4.3 Architecture and Facilities

The EMANICS public Web site is available at <http://www.EMANICS.org>. Nevertheless, there are also other related domain names registered for the project and therefore, the site is also accessible at:

[EMANICS.org](http://EMANICS.org)

[www.EMANICS.net](http://www.EMANICS.net)

[EMANICS.net](http://EMANICS.net)

[www.ist-EMANICS.org](http://www.ist-EMANICS.org)

[ist-EMANICS.org](http://ist-EMANICS.org)

[www.ist-EMANICS.net](http://www.ist-EMANICS.net)

[ist-EMANICS.net](http://ist-EMANICS.net)

#### 4.3.1 Site Structure and Layout

The site structure reflects the requirements presented in section 4.2. An important part of each project's web site is a welcome page. It organizes the view of public information and focuses visitors' attention when they first open the page with a Web browser. Therefore, the public part of the site contains general introduction regarding the EMANICS project as well as publicly available documents. The structure of the EMANICS public area is shown in table 4.1.

Table 4.1 Public area EMANICS Web site structure

Menu item name	Description of the content	Type of content (static, dynamic)
Welcome	General description of the project	static
Open positions	Announcements of open positions at project participants	dynamic
Events	Lists of project events with links to corresponding pages	dynamic
Downloads	Important files and documents for downloading	dynamic
Deliverables	List of deliverables with links to pdf files	dynamic
Partners	Lists of project partners with logo, full name, acronym and links to partner's main Web site	static
Newsletter	List of newsletters with links to pdf files	dynamic
Contact	Contact to main persons of the project (Scientific Leader, Coordinator, Activity Leaders)	static
Member area	Login page for private area Web site	static

The main page contains also three sections with additional information:

- More info (with information about pending and upcoming important events)
- Latest news (shortcut with a link to latest news)

- Links (several important links)

Figure 4.1 presents the EMANICS project welcome page. As previously stated, the EMANICS new site developed under WP4 is based on the initial structure and content prepared and hosted by the partner INRIA since the beginning of the project.

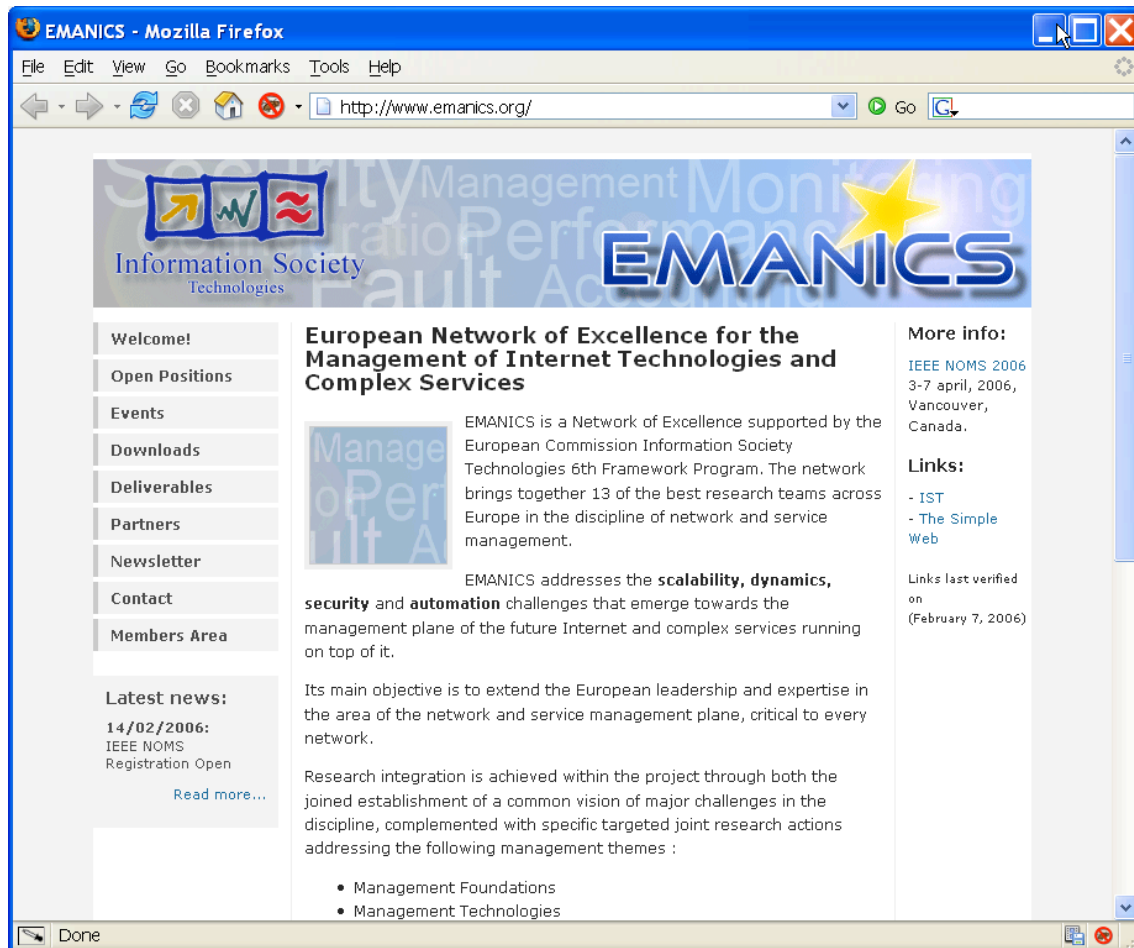


Figure 4.1 – EMANICS homepage

The private area of the EMANICS site is accessible only for project participants. There have been defined individual login names and passwords with different access levels and permissions depending on responsibility and status within the project. The Coordinator partner has the administrative privileges and is responsible for the creation of user accounts and setting appropriate privileges. Users have to login with username and password to access the private area. Figure 4.2 depicts the private area login page, whilst Figure 4.3 depicts the welcome page of this area and Table 4.2 its corresponding structure.

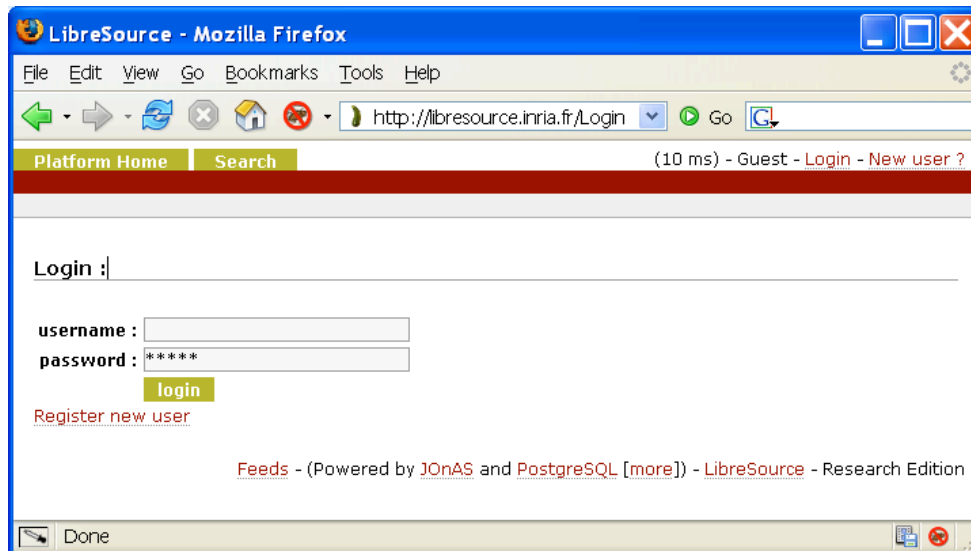


Figure 4.2 – Private area login page

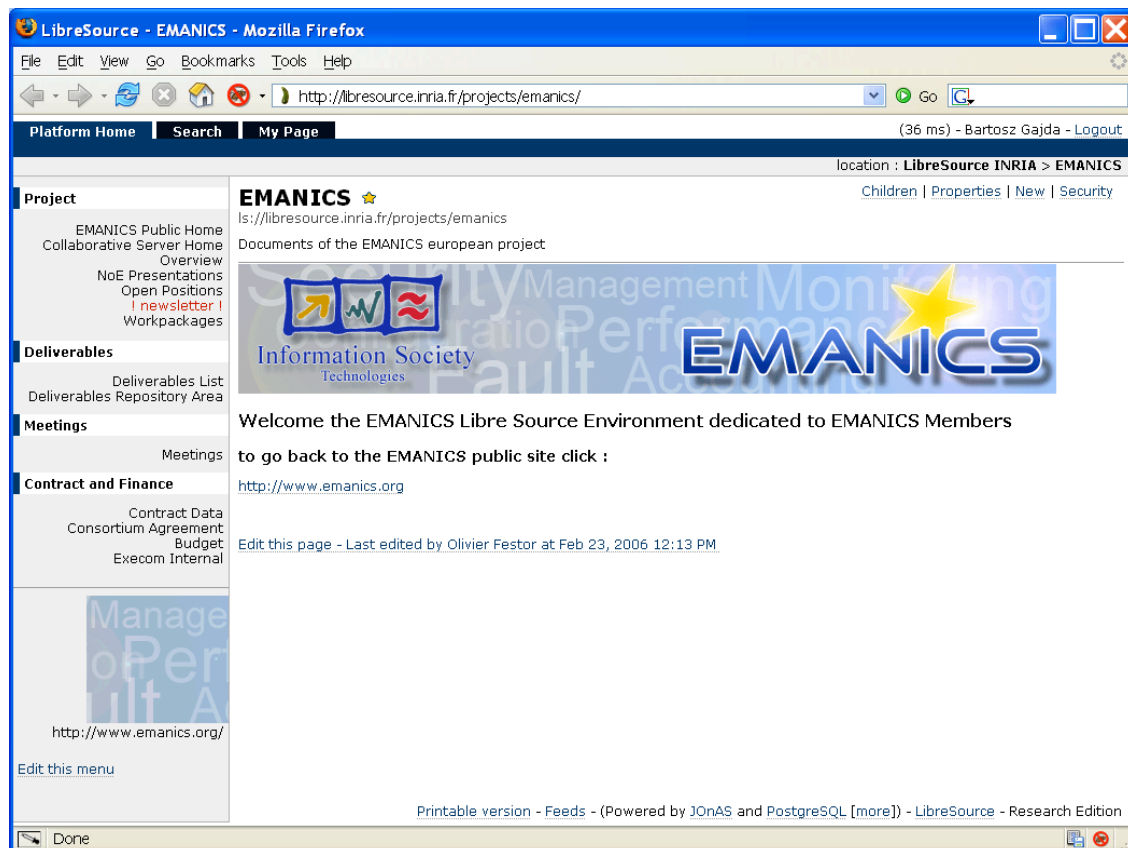


Figure 4.3 – EMANICS private area

Table 4.2 EMANICS private area structure

First level item name	Second level menu item name	Description of the content	Type of content (static, dynamic)
<b>Project</b>	<b>EMANICS Public Home</b>	Link to EMANICS public website	static
	<b>Collaborative Server Home</b>	EMANICS Libre Source Environment start page	static
	<b>Overview</b>	Overview of private area site	dynamic
	<b>NoE Presentations</b>	Lists of presentations with links to files	dynamic
	<b>Open Positions</b>	Announcements of open positions at project participants	
	<b>newsletter</b>	newsletter files	dynamic
	<b>Workpackages</b>	List of packages with links to wiki-pages with subpages of activities, tasks and other descriptions	static
<b>Deliverables</b>	<b>Deliverables List</b>	Table with list of Deliverables per Due Date	dynamic
	<b>Deliverables Repository Area</b>	List of deliverables with links to files	dynamic
<b>Meetings</b>	<b>Meetings</b>	List of meetings with links to wiki-pages with subpages containing meetings minutes, presentations, files etc	dynamic
<b>Contract and Finance</b>	<b>Contract and Finance</b>	List of contract documents with links to files	dynamic
	<b>Consortium Agreement</b>	Consortium Agreement documents	dynamic
	<b>Budget</b>	Budget related documents	dynamic
	<b>Execom Internal</b>	Executive Committee internal area	dynamic

The private part of the Web site allows project participant to:

- Share documents and files
- Provide information about past and future meetings
- Access official project documents
- Collaborate on particular tasks within work packages using a Wikipedia-like interface
- Access deliverables list per due date and deliverables repository

The private part of the site meets most of the requirements mentioned in section 4.2 except mail archives and contact information database whose contents will be introduced later.

Figure 4.4 presents the Wikipedia-like interface, which allows every partner to provide the description of tasks he/she is responsible for. The Wikipedia syntax is very intuitive and popular in modern Internet community so it gives the possibility to quickly update the articles on the private Web site.



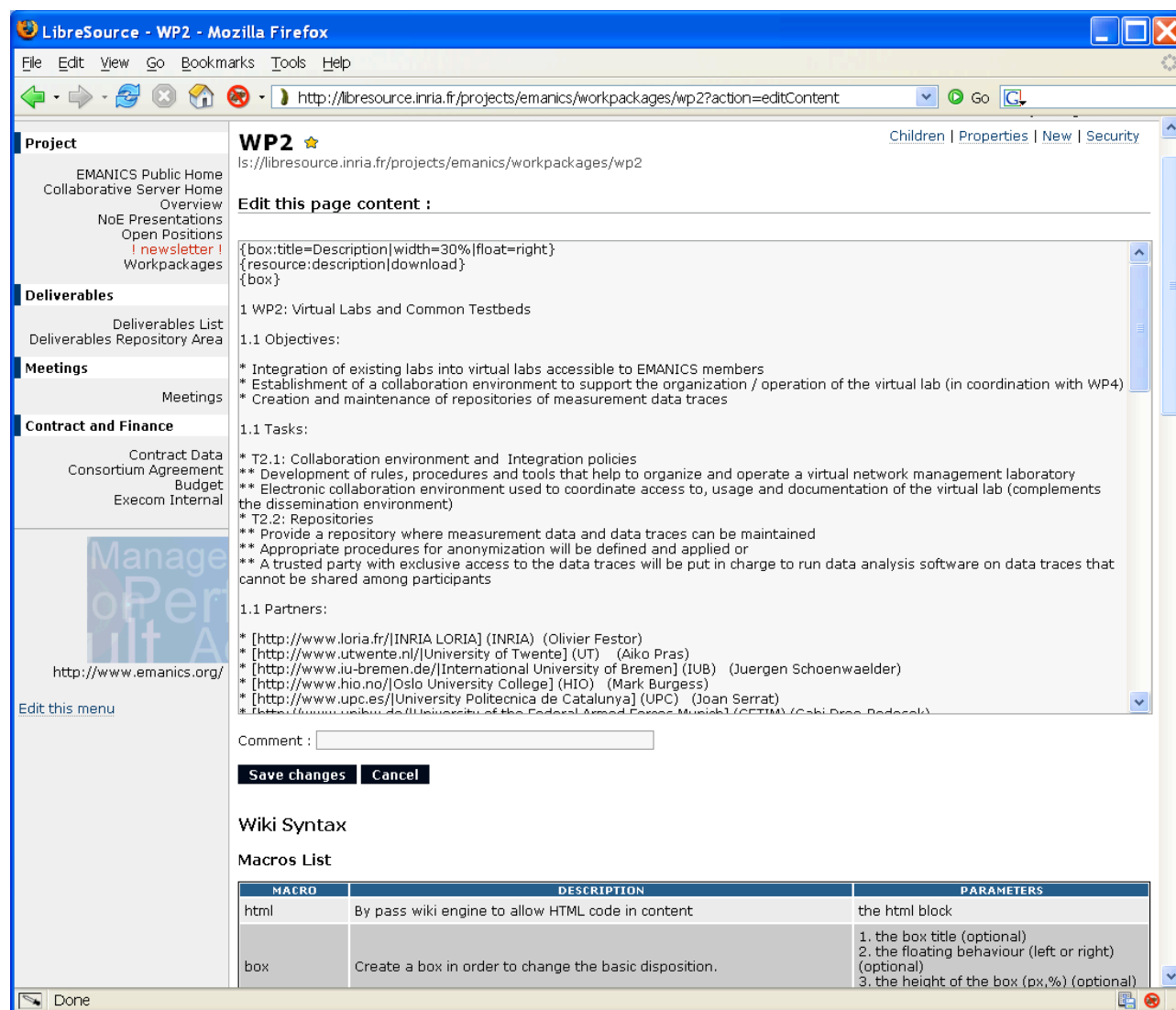


Figure 4.4 – Wikipedia collaboration environment on the EMANICS private area

### 4.3.2 Software Facilities and Configuration

EMANICS Web site is running on the open source Apache HTTP Server. The cooperation Web environment is based on the LibreSource collaboration system [5]. LibreSource is an open source software platform project, initiated in 2003, supported by the National Network of Research and Innovation in Software Technologies. The LibreSource environment has access to the PostgreSQL database server. The Web site meets the current W3C standards; HTML 4, CSS2 and PHP.

### 4.3.3 Hardware and Network Facilities

The EMANICS site is hosted at PSNC in Poznan on a production quality server; Sun Fire V490 (4x UltraSPARC CPU, 16 GB RAM, 292 GB SCSI hard drives, FibreChannel interfaces to SAN disk array) and Gigabit Ethernet network interface. The server is connected to the Polish NREN, which is also operated by PSNC and is based on 10 Gb/s Ethernet connections. The PIONIER network has several connections to the Internet e.g. GEANT2, Telia networks and also several peering connections with neighbouring countries like Czech Republic, Slovakia and Belarus. This hardware configuration and

bandwidth availability guarantee stability and high performance. The hardware and software infrastructure are maintained on a daily basis.

## **4.4 EMANICS Web Site Based on Joomla**

The EMANIC web site running from the beginning of the project and described in the previous section is based mainly on static HTML pages in the public area and on the LibreSource environment in the private area.

One of the goals aimed at WP4 is to allow for quick and efficient building and maintaining of rich content in the EMANICS site. To this aim, a Content Management System (CMS) has been proposed as an enhancement for an existing Web site. CMS system allows easy content updating with user-friendly interface and defined user access based on hierarchical permissions. There are hundreds of CMSs available today but based on PSNC experience and systems evaluation it was chosen to deploy the EMANICS Web site based on Joomla CMS.

### **4.4.1 Joomla Overview**

Joomla [6] is a very popular and powerful Open Source CMS. It is used all over the world for different Web sites from simple ones to complex corporate applications. Joomla is reliable and easy to use. The name is a phonetic spelling of the Swahili word "jumla" meaning "all together" or "as a whole". The first release of Joomla (Joomla 1.0.0) was announced on September 16, 2005. This was a re-branded release of Mambo 4.5.2.3 combined with other bug and moderate-level security fixes. Joomla is released under the GNU General Public License [7].

Joomla is written in PHP language and it uses MySQL database. Joomla includes features such as page caching to improve performance, web indexing, RSS feeds, printable versions of pages, news flashes, blogs, forums, polls, calendars, Web site searching, and language internationalization.

### **4.4.2 Moving EMANICS Web Site to Joomla CMS**

The transition from the current Web site to the Joomla CMS-based site requires the following preparation steps:

- CMS environment installation, configuration, integration with MySQL and Apache servers
- Designing of a template which uses the original EMANICS layout
- Defining internal CMS structure based on sections and categories
- Transferring the content to the new site
- Preparing additional Web pages (for user login and other)
- Creating users accounts and defining hierarchical access permissions

Most of the steps have been already accomplished on the test version server. Figure 4.5 shows the EMANICS test version Web site based on Joomla CMS. Moving to the operational server is in progress.



Figure 4.5 EMANICS test version Web site based on Joomla CMS

The content of the Joomla based Web site is maintained at the backend site, which is presented on Figure 4.6.

**Content Items Manager [ Section: All ]**

Filter:

#	<input type="checkbox"/> Title	Published	Front Page	Reorder	Order	Access	ID	Section	Category	Author	Date
1	<input type="checkbox"/> EMANICS Kickoff Meeting, Munich				1	Public	20	Events	Project internal events	Administrator	11/04/06
2	<input type="checkbox"/> EMANICS WVP Meeting Days, Zurich				2	Public	19	Events	Project internal events	Administrator	11/04/06
3	<input type="checkbox"/> 19th NMRG Meeting				1	Public	21	Events	Conferences	Administrator	11/04/06
4	<input type="checkbox"/> Example FAQ Item 1				1	Public	10	FAQs	Example FAQs	Administrator	12/05/04
5	<input type="checkbox"/> Example FAQ Item 2				2	Public	11	FAQs	Example FAQs	Web master	12/05/04
6	<input type="checkbox"/> test				1	Public	22	General descriptions	Welcome dscr	Administrator	12/04/06
7	<input type="checkbox"/> European Network of Excellence for the Management of Internet Technologies and Complex Services				2	Public	17	General descriptions	Welcome dscr	Administrator	11/04/06
8	<input type="checkbox"/> Partners				1	Public	16	General descriptions	Partners	Administrator	11/04/06
9	<input type="checkbox"/> Welcome to Joomla!				1	Public	1	News	Latest News	Web Master	12/06/04
10	<input type="checkbox"/> Example News Item 1 very longooooog neews indeed				2	Public	6	News	Latest News	Administrator	07/07/04

<< Start < Previous 1 2 Next > End >>

Display #  Results 1 - 10 of 13

Published, but is Pending | Published and is Current | Published, but has Expired | Not Published

Click on icon to toggle state.

Figure 4.6 Backend site of the Joomla-based EMANICS Web site

## 4.5 Future Work

After the transition to the Joomla-based version of the Web site will be accomplished, the following immediate steps have been defined for future work:

- Integration with wiki components  
The idea is to copy the LibreSource wiki content to the Joomla site updated with an additional Joomla wiki component. In this way the whole content will be integrated in one system. Such integration allows easier management as well as introducing more features in the site like RSS/Atom feeds, search features, indexing, positioning, etc.

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- Integration with new dissemination tools, like the podcasting system described in section 5
  - Integration with the open source inventory and repository developed in Work-package 6

## 5 Design of the Future Dissemination Environment

### 5.1 *New Dissemination Tools: PODCASTs*

The number of available Podcasts is growing very fast and major organizations (like national broadcasting companies) already provide Podcasts or plan to provide them soon. Although Podcasts can be played on portable iPod players, they can also be played on normal computers. The technology behind Podcasts is relatively straightforward; it is therefore not the technology, but the fact that all major organizations have embraced this technology that makes Podcasting so interesting. Podcasting can not only be used to replay radio and television broadcasts, but also to distribute conference presentations and panels. A very interesting possibility is to distribute teaching and tutorial information via Podcasts.

Within EMANICS it is important to get familiar with Podcast equipment and software. For this purpose we will create several kinds of Podcasts. The experiences while creating these Podcasts will be discussed within EMANICS, so that other partners can avoid common pitfalls when creating additional Podcasts.

The Podcasts created within WP4 will target at students and researchers in the area of network and service management. We will start with a Podcast of the Distinguished Experts Panel (DEP) panel of the NOMS 2006 symposium [8]. The topic of this panel is "VoIP management"; this topic is interesting for a broad audience and the resulting Podcast will therefore be distributed via the NOMS Web site, the EMANICS Web site as well as the SimpleWeb. In addition we will try to create Podcasts of other events, like for example DSOM 2006 [9].

A second kind of Podcasts will specifically target at students in the area of network management and provide a tutorial of SNMP. We will start with a basic SNMP tutorial; more detailed tutorials on topics like SMI and SNMP security may later be added (presumably as part of another activity).

Although the primary goal of this work is to get experience with Podcast creation, the resulting Podcasts will remain available after completion of the project. To create the Podcasts, specific equipment from Apple has been acquired.

### 5.2 *Content Integration*

The primary objective of the EMANICS NoE, as specified in its description of work, is to foster the necessary breakthrough in research, integration and coordination efforts required to enable novel management frameworks solving the challenges emerging from the next generation networks. The strategic objective of the EMANICS is thus to bring together all major European research groups focusing on several aspects of the **network and service management plane** discipline. The Network of Excellence will work together to structure research and development in the field with the aim of collaboratively building the next generation management framework.

In this respect one major aim of EMANICS is to structure and integrate the existing and ongoing research in network and service management primarily in the European realm. The purpose of this is twofold, namely to solidify and categorise innovation and research in the field and through this understanding and monitoring to design and devise next generation management frameworks.

To achieve this objective, one of the major activities involved in Workpackage 4 is the integration of related content in the field of network and service management and its electronic dissemination to the public. For this purpose the content referring to network and service management should be collected, organised and presented through a web-based information portal conforming to a standardised format to ensure public accessibility and incessant availability of related and up-to-date information.

We have thus proceeded in a comprehensive requirements analysis regarding such an information portal and devised a set of design guidelines. The content dissemination environment, hereinafter referred to as information portal, will present all the research and development work and views on network and service management, while in parallel it will provide assistance to those initiating their involvement in the field with the use of tutorials and introductory material. Current research and related society news and conferences will be another aspect of this information portal as well as the possibility of establishing collaboration and communication links with experts in the field.

Due to its inherent diversity and the vast amount of information regarding the domain of network and service management, we will restrict our initial research on content integration and the design of a future dissemination environment to the sub-field of "Quality of Service Management". The discussion and design can be extrapolated to incorporate the general field of network and service management, since it follows a hierarchical approach of presenting related content, with higher layers of abstractions integrating more specialised topics.

The major requirements from an information portal integrating network and service management research and development information can be summarised in the following:

- **Non-Functional Requirements**

- User-friendly interface
- Ease of navigation
- Lightweight operation (i.e. without the need for "heavy" plugins)
- Compliant to W3C web standards
- Incorporate usability and accessibility enhancements
- Be manageable and allow for rapid content integration
- Allow for dynamic control of content
- Easily extensible

- **Functional Requirements**

- Contain all related information regarding network and service management
- Provide categorisation/hierarchy of related research in order to allow for ease of navigation and access to specialised information
- Tutorials and initial material for basic understanding of the domain
- Research publications and technical reports
- Relevant research projects
- Open-source software in the area
- Active conferences/workshops/meetings in the area
- Calls for papers and calls for research proposals in the community of network and service management
- Related journals and news events/updates/bulletins
- Industrial efforts/technologies



- Directory of related societies and academic institutions
- Groups of interests in the form of topic-related mailing lists

The non-functional requirements are generic and apply to the design of every Web site, in order for it to be efficient and have high degree of user satisfaction and penetration. The functional requirements refer to the services the information portal should provide based on its objective, of integrating content related to network and service management.

As far as the Quality of Service (QoS) Management information portal is concerned, we can identify the following categories of content to be integrated:

- **IP Networking**
  - IP Multicast management
  - Admission control
  - MPLS-based QoS Provisioning
  - Inter- and intra-domain traffic engineering
  - Survivability / Resilience
  - Satellite QoS provisioning
- **Fixed Networks QoS Management**
  - Policy-based QoS Management
  - Policy analysis and refinement
  - Web services / XML –based management
  - Platforms, software tools for management
- **Wireless Networks and MANET Management**
  - QoS management for wireless ad hoc networks
  - MANET management
  - Context-awareness for MANET management
  - Service discovery/provisioning in MANETs

It is evident that the list of categories and sub-categories does not mean to be exhaustive, rather indicative of the various and most representative aspects of the diverse domains that fall under the QoS Management umbrella. The non-functional requirement of extensibility satisfies the introduction of new categories and content by the administrators of the content integration environment and their delegates with sufficient authorisation privileges.

Before proceeding in elaborating the design of the content integration information portal, it is essential as in every information systems development process to perform a stakeholder analysis and identify all potential stakeholders and their involvement. In the following, we summarise the stakeholders of the information portal. The term stakeholder refers to any person or group who will be affected by the system, directly or indirectly. This analysis assists in capturing all possible views of the system and thus ensuring the availability of all expected functionality.

- **Content Providers**

The role of this category of stakeholders is to provide content for the information portal. On a theoretic basis everyone could provide appropriate content, if we were to adopt the notion of an open environment like Wikipedia. In our design



though in order to retain research excellence and ensure validity of information we chose to consider as Content Providers only EMANICS partners and delegates of them. This restricted set of content providers is responsible for the information presented in the Web portal, its modifications and timeliness. The diversity and wide range of research interests covered by the expertise of EMANICS partners guarantees that accurate and high-end quality information is being presented in the information portal, which in turn will lead to a high degree of user satisfaction.

- **Content Administrators**

In order to ensure that there are no conflicts between content provided by different providers and to satisfy a common presentation of information under a general homogeneous structure and format, the Content Administrators take action. For its category and sub-topic there is a dedicated Content Administrator with the aforementioned as its responsibilities. This role will be assumed by EMANICS partners according to their areas of expertise.

- **System Administrators**

The role of the System Administrators is to technically support the operation of the information portal and the needs of the Content Providers and Content Administrators. This involves the installation of the appropriate software tools and their continuous support as well as the management of the infrastructure necessary for the incessant and faultless operation of the information portal.

- **Testers**

The group of testers will involve a selection of EMANICS partners that will serve as the initial users of the information portal, prior to its public domain deployment. Any potential faults and deficiencies will be recognised and reported to the administrators – both system and content – to examine and potentially correct.

- **Public domain users**

These are the final users of the service, namely the information portal constituting the point of content integration regarding network and service management. The public domain users can access information, but cannot impose directly any changes to the information portal; rather they can send comments to the Content Administrators for desired alterations in aspects of the information portal.

Based on the previous analysis, we have produced the design of the information portal used for the network and service management content integration. The design choices we made are justified by the previous discussion and are in compliance to the requirements analysis performed. The structure of the information portal will be hierarchical. The top level, main entry point of the information portal will be devoted to the general category titled “QoS Management”. Furthermore, the rest of the sub-categories and sub-topics will be structured and will be accessible using a tree structure under this main entry point. In this way the user can semantically navigate in the information portal to locate desired information, as well as information related to that.

Each category will have a common Web design in terms of user interface and general content classification. The content will be classified and will be presented to the users in the following layout, as identified by the functional requirements of the information portal:

- General information regarding the topic
- Tutorials and initial material (i.e. online presentations) for basic understanding of the domain
- Research publications and technical reports
- Relevant research projects
- Open-source software in the area
- Active conferences/workshops/meetings in the area
- Calls for papers and calls for research proposals closely related to the topic
- Related journals and news events/updates/bulletins
- Industrial efforts/technologies
- Directory of related societies, researchers and academic institutions
- Groups of interests in the form of topic-related mailing lists
- Links to other related categories/topics in the information portal

In order to ensure extensibility and manageability of the information portal the generic design we have presented must be upgraded. The technical aspects of the design require equally cautious consideration and planning. The technologies that will be used should allow the generic implementation and allow for ease of deployment and effortless introduction of new content or update of existing one. In this sense, we propose exploiting XML technologies for storing the content information and XSLT for the presentation of the content through the information portal. The validation of the content-filled XML documents for reasons of consistency will be performed and guaranteed with the use of XSD documents describing the features necessary to be held by every conformant XML document. These design choice bears the following benefits:

- Interoperability is promoted with the use of XML, much needed in a distributed collaborative environment such as the EMANICS NoE
- Extensibility is promoted, since new content can easily be appended in existing XML documents and modifications can similarly be employed.
- The content integration information portal design is abstracted from the content itself, since it is influenced only by the structure of the XML documents while XSLT style sheets handle the presentation.
- Platform independence can be obtained with the use of these technologies.
- The use of open-source technologies ensures low cost of the implementation and promotes ease of technical support and non-dependence on industrial standards.

The deployment of the web-based information, portal that will serve as the future environment for content integration, is planned in the near future. Initial results on user satisfaction regarding the user interface, the usability and accessibility of the information portal are highly anticipated to guide the optimisation of it and serve as guidelines for potential modifications. The first step of the deployment will involve the content of Quality of Service management, allowing for expansion to the general notion of Network and Service Management, at a latter stage.

## 6 Summary and Conclusions

This deliverable presents part of the work carried out in Work Package 4 during the initial six months of the EMANICS project, intended to specify, design and implement the electronic dissemination environment pursued in this NoE.

The EMANICS Web site has been specified and implemented. Nowadays is operational and partially satisfies the twofold specification objective, namely to serve the EMANICS participants in their exchange of information and also make the whole EMANICS network of Excellence visible worldwide.

A lot of work has been done in the above area, even to solve difficulties not foreseen in principle like the migration from its original hosting infrastructure to the current one and also the migration between operational environments. But clearly a lot of work still needs to be done. In the following months we face important challenges as far as to make the operation of the Web site stable and consistent in the new operational environment. In addition, we need to prove the advantages of using this site in terms of allowing for dynamic content integration and also make evident the impact of this Web site in the other workpackages of the NoE.

Work Package 4 team has also covered significant steps in the area of the specification of content integration. New dissemination tools like Podcats have been started to be analysed and a portal on QoS Management has been specified although is not yet operational. In the following months we expect to have it on the air and, based on its results, produce at the end of the current year the guidelines that will allow for the integration of the partner's local environments in the EMANICS framework. Based also on the analysis of this portal we expect to launch other thematic portals during the life of the project.

Achievements in terms of new dissemination tools are also being ported to existing Web pages like the SimpleWeb. The conception of dissemination in the EMANICS network of excellence is not to own and concentrate everything in a monolithic infrastructure but to impact making use of all means and tools. Also, we understand that this Work Package 4 has an important role in serving the other work packages to achieve their objectives. In this sense we have already started an initiative to make automatic the most common workflows in the project that are also part of the electronic dissemination environment but will be reported in a future deliverable.

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## Abbreviations

CMS	Content Management System
CSS2	Cascading Style Sheets 2
DMTF	Distributed Management Task Force
GNU	The GNU Project
HTTP	Hyper Text Transfer Protocol
IETF	Internet Engineering Task Force
IRTF	Internet Research task Force
ISO	International Standards Organization
ITU	International Telecommunication Union
MANET	Mobile Ad-hoc Networks
NoE	Network of Excellence
OMG	Object Management Group
PHP	PHP Hypertext Preprocessor
QoS	Quality of Service
RFC	Request For Comment
RSS	Really Simple Syndication
SNMP	Simple Network Management Protocol
TMF	Tele Management Forum
TMN	Telecommunication Management Network
W3C	World Wide Web Consortium
XML	Extended Markup Language
XSD	XML Schema Definition
XSLT	Extensible Stylesheet Language Transformations

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